



PlantScape Controller Implementation

Lesson 1

Configuring a Continuous Control Strategy

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Notes

Introduction

The purpose of this Lesson is to give you the knowledge to be able to configure a continuous control strategy. After you complete this Lesson you should be able to identify the procedure to configure a continuous control strategy.

Objectives

- ❶ Understand the naming of new Control Modules
- ❷ Understand the naming of Function Blocks
- ❸ Configure a PID loop CM



Creating Control Modules

➤ Creating and saving a module

- Set up the Control Builder with both the **Library** and **Project** views visible.
- Click and expand System under the **Library** tab so that CONTROLMODULE is in view.
- Drag and drop Control Module onto the **Project** Root
 - The new Control Module appears under the Root Project Tree
 - Control Module names are sequentially numbered (for example, CM30, CM31, etc.)
 - The new Control Module is automatically saved to your hard drive

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Notes

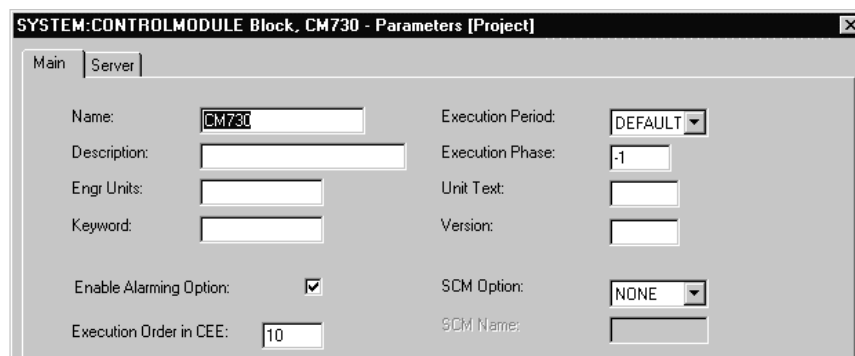
Creating and saving a module

To create a Control Strategy, a Control Module must be created and function blocks inserted and connected. When you drag & drop the CM to the Project root it will appear under the Root Project Tree. Control Module names are sequentially numbered (for example, CM30, CM31, etc.). The new Control Module is automatically saved to your hard drive.

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➤ **Configuring a module**

- Click the new Control Module to select it and right click to display the selection options
- Click on **Configure Param**

The screenshot shows a dialog box titled 'SYSTEM:CONTROLMODULE Block, CM730 - Parameters [Project]'. It has two tabs: 'Main' and 'Server'. The 'Main' tab is active, showing various configuration fields for the CM730 module. The fields are arranged in two columns. The left column includes 'Name' (set to CM730), 'Description', 'Engr Units', 'Keyword', 'Enable Alarming Option' (checked), and 'Execution Order in CEE' (set to 10). The right column includes 'Execution Period' (set to DEFAULT), 'Execution Phase' (set to -1), 'Unit Text', 'Version', 'SCM Option' (set to NONE), and 'SCM Name'. Each field is either a text box or a dropdown menu.

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Notes

Configuring a module

To configure a CM, you must do two things

- Define the parameters of the entire object.
- Create, configure, and connect function blocks

They can be done in any order. For this training we will configure the Control Module parameters first.

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➤ **Configuring a module ... continued**

- Enter the following information
 - Name **CM#_FIC101**
 - Description **STEAM FLOW CTRL**
 - Engr Units **M3/Sec**
 - Keyword **STEAM**
 - Execution Period **200MS**

Main | Server

Name: Execution Period:

Description: Execution Phase:

Engr Units: Unit Text:

Keyword: Version:

- Click on the **Server** Tab and enter **sysDtlPIDA.dsp** for the Point Detail Page

Server Parameters

Point Detail Page

Associated Display

Group Detail Page

- Enter **sysGrpPIDA.dsp** for the Group Detail Page
- Click **OK** and observe that the CM is placed in the **Project** tab by its new name (CM#_FIC101).

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Notes

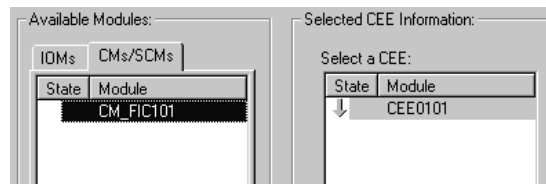
Configuring a module

It is important that you use descriptive names for **Description** and **Keyword**. The Description should represent what the CM will be doing in your project. In this example the CM will be controlling steam flow -- therefore, the keyword STEAM is used.

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➤ Assigning CMs to the CEE

- From the Control Builder Tools menu, click **Assign** to display the Controller Assignments screen
- Locate the Available Modules section on the left side of the window and Click **CM#_FIC101** in the tab labeled CM/SCMs
- Select the destination CEE
 - CEE0101



If...

your system has multiple controllers...

you only have one controller...

Then...

click the destination CEE from the window section labeled **Select CEE**.

it will be selected by default.

- Click **Assign** in the center of the window and after a few seconds, your CM will appear in the section of the window labeled **Assign Modules**

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Notes

Assigning CMs to the CEE

Before you create and configure the function blocks in your CM, assign the CM and the IOMs to the CEE.

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➤ Adding Function Blocks to a CM

- Double-click the **CM (CM#_FIC101)** in the **Project** Tab to open your CM so function blocks may be added
- Open the **Library** Tab in a Tree View window and expand the **IOCHANNEL** library
- Click the block named **AIOCHANNEL** and drag it into the CM
- Drag the following blocks into your CM, in this order:

Library Directory

DATAACQ

REGCTL

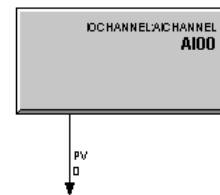
IOCHANNEL

Block Name

DATAACQ

PID

AIOCHANNEL



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Notes

Adding Function Blocks to a CM

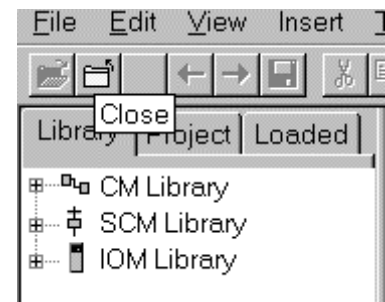
Once the CM and the IOMs are assigned to the same CEE, you can add function blocks to your CM and configure them.



For more information on how to add function blocks to a CM, refer to the *Control Building Guide, Control Module Creation, Creating an Instance of a Basic Function Block*.

When adding Function Blocks you may want to close one of the tree-views to give yourself more space to edit your CM. To do this you

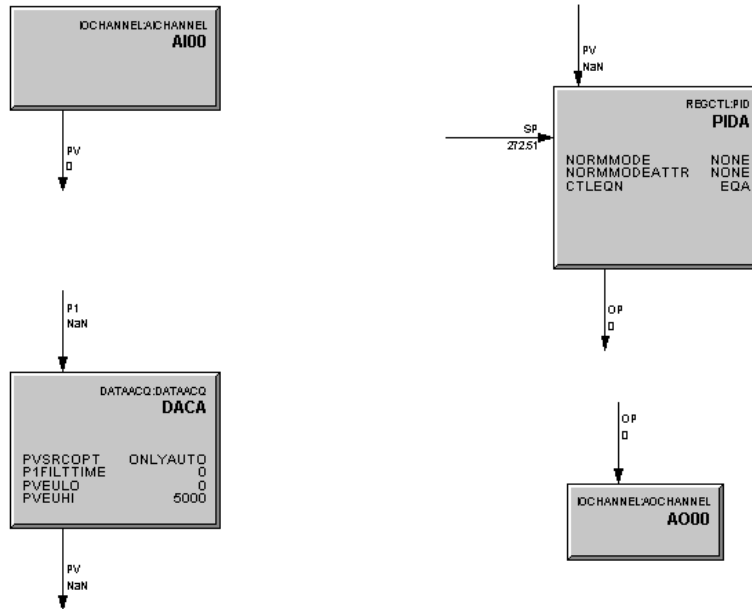
- Click Tree View window
- Click the Close button on the toolbar (second icon from the left)



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➤ **Adding Function Blocks to a CM ...continued**

- Arrange your blocks on the screen as shown below.



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Notes



You may find it useful to close both tree views at this point, which will enable you the space to arrange the blocks in this manner without having to scroll.

Select each tree view individually by clicking on one of the tree view tabs or the title bar.

Click **File -> Close** or click on the Close toolbar button for each tree view window.

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➤ Configuring an AI Channel block

- Double-click the **AICHANNEL** block
- Name the block **AI0(# minus 1)** i.e. **AI00** for team 1, **AI01** for team 2
- Click the Module Name port and click **AI_IOM_01** to display the IOM

Channel Number	Channel Name
0	CM_FIC101.AI00
1	

- In the box labeled **Currently Assigned Slots In Selected Module**, click **Slot (# minus 1)**
(Slot 0 for team 1, Slot 1 for team 2)
- Click **Assign Channel**
- Click **OK** to close the AICHANNEL Parameter configuration form

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Notes

Configuring an AI Channel block

Once the CM and the IOMs are assigned to the same CEE, you can add function blocks to your CM and configure them.



For more information on how to configure function blocks, refer to the *Control Building Guide, Control Module Creation, Using the Parameters Configuration form*.

The name of the module and the name of the channel appear by the slot. This helps you keep track of which slots are assigned and which slots are available in each of your IOMs.



➤ **Configuring a Data Acquisition block**

- Double-click the **DATAACQ** block
- Enter the following information:
 - Name **DACA** ⚠
 - Engr Units **M3/Sec**
 - Execution Order **20**
 - PVEU Range Hi **5000**
 - PVEU Range Lo **0**
 - PV Limits Hi **5500**
 - PV Limits Lo **0**
 - PV Character **None**

- Clamping/Filtering
 - **ENABLE**

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Notes

Configuring a Data Acquisition block

The PVEU Range is set to the Hi and Lo limits for the process steam. In the PVEU limits, because of our simulation, we have added a buffer of 500 to prevent the PV from going to NaN (Not a Number).

Clamping

A clamping option of ENABLE is selected. Enabling clamping will force the PV to stop when the PV Limits Hi or Lo are reached. Again this prevents the PV from going to NaN.



For more information on how to configure function blocks, refer to the *Control Building Guide, Control Module Creation, Using the Parameters Configuration form*.



It is important that you name this block **DACA**. If you do not name the block **DACA**, you will not be able to see many parameters from the Station Point Detail Display.

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➤ Configuring a Data Acquisition block ... continued

- Click the **Alarms** tab
- Enter the following information on the **Alarms** form for

PV High:

– Trip Point **4000**
– Priority **HIGH**
– Severity **0**

PV High High:

– Trip Point **4500**
– Priority **URGENT**
– Severity **0**

	Trip Point	Priority	Severity
PV High High :	4500	URGENT	0
PV High :	4000	HIGH	0

- Click **OK** to close the **DATAACQ** block

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Notes

Configuring Alarms

The Alarms in the DATAACQ block must be set within the range of your PVEU Range Hi and PVEU Range Low. This will cause your block to go into Alarm if the ranges are Exceeded.



It is important that you follow the sequence. The system will not allow you to enter the PV High High before you enter the PV High.

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➤ Configuring a PID block

- Double-click the **PID** block
- Enter the following information:
 - Name **PIDA** ⚠
 - Engr Units **M3/Sec**
 - Execution Order **30**
 - PVEU RANGE HI **5000**
 - PVEU RANGE LOW **0**
- Click the **Algorithm** tab
- Enter the following algorithm information :
 - T1 **0.1**
 - T1 High Limit **2.0**
 - High Gain Limit **2.0**
 - Gain Options **Check LIN**
 - Overall Gain **.5**

Configuration Parameters | Monitoring Parameters | Block Preferences

Main | Algorithm | SetPoint | Output | Alarms | SCM | Block Pins

Control Equation Type: **EQA**

Control Action: ☐ DIRECT ☒ REVERSE

Integral Time

T1 (minutes): **0.1**

T1 High Limit (minutes): **2**

T1 Low Limit (minutes): **0**

Gain Options

☒ LIN

Overall Gain: **0.5**

☐ GAP

Gap High Limit: **0**

Gap Low Limit: **0**

Gap Gain Factor: **1**

Linear Gain Factor: **1**

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Notes

Configuring a PID block



For more information on how to configure function blocks, refer to the *Control Building Guide, Control Module Creation, Using the Parameters Configuration form*.



It is important that you name this block **PIDA**. If you do not name the block **PIDA**, you will not be able to see many parameters from the Station software Detail Displays.

- Trip Point **95**
- Priority **Low**
- Severity **0**

Configuration Parameters		Monitoring Parameters		Block Preferences	
Main	Algorithm	SetPoint	Output	Alarms	
		SCM	Block Pins		
Alarms					
Type	Enable Alarm	Trip Point	Priority	Severity	
OP High	<input type="checkbox"/>	95	LOW	0	
OP Low	<input type="checkbox"/>	NaN	LOW	0	

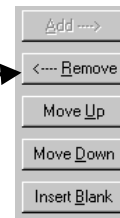
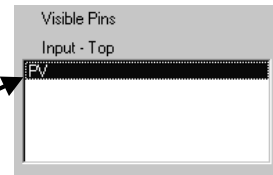
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Notes

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➤ Moving Pins on Function Blocks ⚠

- Click on the **PID** block, then right click to show the drop-down menu. Select **Configure Parameters ... PID Block Object**.
- On the Configuration Form, click the **Block Pins** tab
- Click on **PV** in the Input-Top box
- Click on **Remove**



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Notes

Moving Pins on Function Blocks



For more information on adding and removing pins on function blocks, refer to the *Control Building Guide, Control Module Creation, Using the Block Configuration form*.

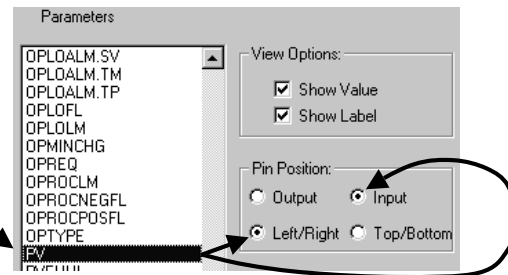


In order to make the routing of the soft wiring from the **DACA** block to the **PIDA** block more direct and neat, we will move the PV input from the top of the **PIDA** block to the Left. To accomplish this we must first remove the pin and then reinsert it in the proper location. This will not improve performance, just clean up the wiring.

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➤ Moving Pins on Function Blocks ...continued

- Click on **PV** in the Parameters box and ensure that Pin Position has Input and Left/Right selected



- Then click on **Add** and **OK**
- The PV Pin position should now appear on the left side of your PID function block



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Notes

Moving Pin's on Function Block's



For more information on Adding and Removing Pins on function blocks, refer to the *Control Building Guide, Control Module Creation, Using the Block Configuration form*.



Here we add the PV pin to the PID Block in the Input, Left/Right location. In this location the soft wiring will be much cleaner.

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➤ Configuring an AO block

- Double-click the **AOCCHANNEL** block
- Name the block **AO0(# minus 1)** i.e. **AO00** for team 1, **AO01** for team 2
- Click the **Module Name** port and click **AO_IOM_01** to display the IOM
- In the box labeled Currently Assigned Slots In Selected Module, click **Slot (# minus 1)**
- Click **Assign Channel**

- Click **OK** to close the **AOCCHANNEL** function block

Channel Number	Channel Name
0	CM_FIC101.AO00

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Notes

Configuring a Data Acquisition block



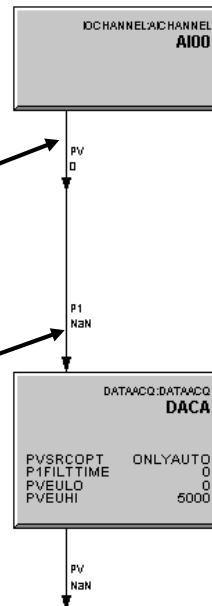
For more information on how to configure function blocks, refer to the *Control Building Guide, Control Module Creation, Using the Parameters Configuration form*.

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➤ **Connecting Function Blocks**

Using the Menu Method

- Click
 - **Insert**
 - **Wire**
- On the **AICHANNEL** block, click the pin labeled **PVVALSTS**
- On the **DATAACQ** block, click the pin labeled **P1** and a wire will connect the two pins



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Notes

Before you begin

Your final step in this Creating a Control Module tutorial is to connect the function blocks together to form a control strategy. (You can connect blocks together at any time you choose, before or after configuring them.)



For more information on how to connect function blocks, refer to the *Control Building Guide, Control Module Creation, Connecting and Disconnecting blocks*.

Methods

Menu Method

- Open a CM in the Project tab
- Click Tools > Wire and observe the cursor change to a plus (+) sign
- On one block, click the pin to be wired from
- On another block, click the pin to be wired to and a wire is connected between them.

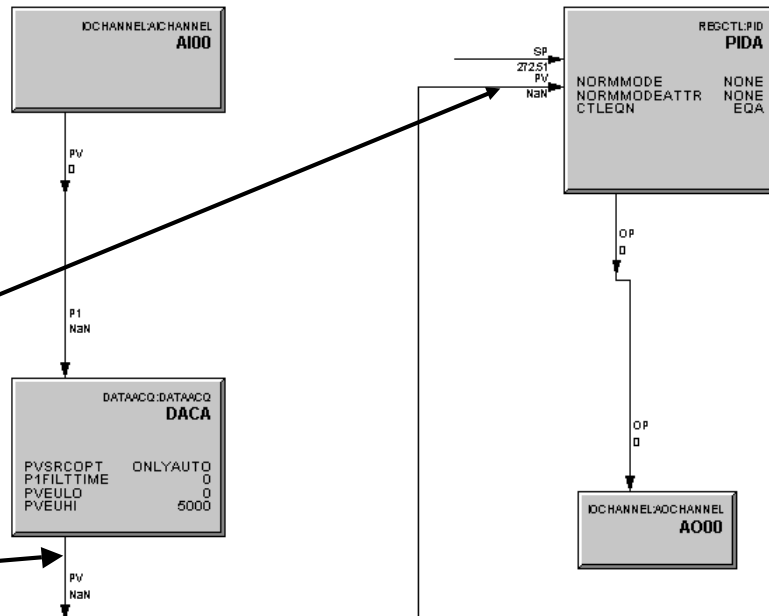
Methods continued on the next page...

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➤ **Connecting Function Blocks**

Using the Quick Method

- Open the **FIC101** CM in the **Project** tab
- Double-click on the pin labeled **PV** at the bottom of the **DATAACQ** block
- Click the **PID** block pin labeled **PV** and a wire connects the two pins
- Complete the rest of the connections as shown
- Close and Save Changes to the CM



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Notes

Methods ...continued

Quick Method

- Open a CM in the Project tab
- Double-click on the pin to be wired from and observe the cursor change to a plus (+) sign
- Click the pin to be wired to and a wire connects the two block parameters together



If you are trying to route a wire through a specific location you can do this by clicking at turn points between pin connections, as in the connection above between the **DACA** and **PIDA** blocks. Just double click on the **DACA** bottom pin and then click over to the right and it will draw the first part of your wire. Continue this to complete the wire connection. You can put as many bends and turns in a wire as you like. When you reach an appropriate destination, the destination arrow will turn Cyan.

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This completes....

PlantScape Controller Implementation

Lesson 1

**Configuring a
Continuous Control Strategy**

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Notes